भारतीय मानक

Indian Standard

IS 18925 (Part 3) : 2024
IEC 62561-3 : 2023

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भाग 3 स्पार्क गैप को पृथक करने के लिए आवश्यकताएँ (आईएसजीएस)

Lightning Protection System Components (LPSC)

Part 3 Requirements for Isolating Spark Gaps ISGs

ICS 29.020; 91.120.40

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Electrical Installation Sectional Committee, ETD 20

NATIONAL FOREWORD

This Standard (Part 3) which is identical to IEC 62561-3 : 2023 'Lightning protection system components (LPSC) — Part 3: Requirements for isolating spark gaps (ISGs)' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Electrical Installation Sectional Committee and approval of the Electrotechnical Division Council.

This standard is published in several parts. The other parts in this series are:

Part 1 Requirements for connection components

Part 2 Requirements for conductors and earth electrodes

Part 4 Requirements for conductor fasteners

Part 5 Requirements for earth electrode inspection housings and earth electrode seals

Part 6 Requirements for lightning strike counters LSCs

Part 7 Requirements for earthing enhancing compounds

Part 8 Requirements for components for isolated LPS

The text of the IEC standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appears referring to this standard, they should be read as 'Indian Standard'; and

b) Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to International Standards for which Indian Standards also exists. The corresponding Indian Standards, which are to be substituted, are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 6957 : 1988 Copper alloys — Ammonia test for stress corrosion resistance	IS 16872 : 2019 Copper alloys — Ammonia test for stress corrosion resistance	Identical
IEC 62305-1 : 2010 Protection against lightning — Part 1: General principles	IS/IEC 62305-1: 2010 Protection against lightning — Part 1 General principles	Identical

The Committee has reviewed the provisions of the following international standards referred in this adopted standard and decided that they are acceptable for use in conjunction with this standard.

International Standard	*Title*
ISO 4892-2 : 2013	Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon arc lamps
ISO 4892-3 : 2016	Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps
ISO 4892-4 : 2013	Plastics — Methods of exposure to laboratory light sources — Part 4: Open-flame carbon-arc lamps

(*Continued on third cover*)

CONTENTS

INTRODUCTION

This part of IEC 62561 deals with the requirements and tests for lightning protection system components (LPSC), specifically isolating spark gaps (ISGs) used for the installation of a lightning protection system (LPS) designed and implemented according to the IEC 62305 series.

Indian Standard

LIGHTNING PROTECTION SYSTEM COMPONENTS (LPSC)

PART 3 REQUIREMENTS FOR ISOLATING SPARK GAPS ISGS

1 Scope

This part of IEC 62561 specifies the requirements and tests for isolating spark gaps (ISGs) for lightning protection systems.

ISGs can be used to indirectly bond a lightning protection system to other nearby metalwork where a direct bond is not permissible for functional reasons.

Typical applications include the connection to

- earth-termination systems of power installations,
- earth-termination systems of telecommunication systems,
- auxiliary earth electrodes of voltage-operated, earth fault circuit breakers,
- rail earth electrodes of power and DC railways,
- measuring earth electrodes for laboratories,
- installations with cathodic protection and stray current systems,
- service entry masts for low-voltage overhead cables,
- bypassing insulated flanges and insulated couplings of pipelines.

Applications where follow currents occur are not included.

Extra requirements for the components can be necessary for LSCs intended for use in hazardous atmospheres.

NOTE 1 In CENELEC member countries, testing requirements of components for explosive atmospheres are specified in CLC/TS 50703-2.

NOTE 2 Testing of components for an explosive atmosphere (as defined in the IEC 60079-10 series) is not covered by this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-52:2017, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

IEC 60068-2-75:2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 62305-1:2010, *Protection against lightning – Part 1: General principles*

IEC 62561-1, *Lightning protection system components (LPSC) – Part 1: Requirements for connection components*

ISO 4892-2:2013, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 4892-3:2016, *Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV lamps*

ISO 4892-4:2013, *Plastics – Methods of exposure to laboratory light sources – Part 4: Open-flame carbon-arc lamps*

ISO 6957:1988, *Copper alloys – Ammonia test for stress corrosion resistance*

ISO 22479:2019, *Corrosion of metals and alloys – Sulphur dioxide test in a humid atmosphere (fixed gas method)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
ISG
isolating spark gap
component with discharge distance for isolating electrically conductive installation sections

Note 1 to entry: In the event of a lightning strike, the isolated sections are temporarily connected conductively as the result of response to the discharge.

3.2
sparkover voltage
maximum voltage value before disruptive discharge between the electrodes of the ISG

3.3
withstand voltage
value of the test voltage to be applied under specified conditions in a withstand test, during which a specified number of disruptive discharges is tolerated

3.4
power frequency withstand voltage
RMS value of a sinusoidal power frequency voltage that the ISG can withstand

3.5
DC withstand voltage
value of a DC voltage that the ISG can withstand

3.6
rated withstand voltage
value of a withstand voltage declared by the manufacturer to characterize the isolating behaviour of an ISG

3.7
$U_{W\,AC}$
rated power frequency withstand voltage
value of a power frequency withstand voltage declared by the manufacturer to characterize the isolating behaviour of an ISG

3.8
$U_{W\,DC}$
rated DC withstand voltage
value of a DC withstand voltage declared by the manufacturer to characterize the isolating behaviour of an ISG

3.9
impulse sparkover voltage
impulse voltage of the waveshape 1,2/50 to classify the sparkover behaviour of the ISG

3.10
U_{imp}
rated impulse sparkover voltage
manufacturer's declaration of the ISG sparkover voltage

3.11
isolation resistance
ohmic resistance of the ISG between the active parts

3.12
I_{imp}
lightning impulse current
impulse current that classifies an ISG

Note 1 to entry: Five parameters shall be considered: the peak value, the charge, the duration, the specific energy and the rate of rise of the impulse current.

4 Classification

4.1 According to the capability of ISGs to withstand lightning current

The following classes apply, in accordance with Table 1:

a) class H for heavy duty;
b) class N for normal duty;
c) class 1L for light duty;
d) class 2L for light duty;
e) class 3L for light duty.

4.2 According to ISGs installation location

The following classes apply:

a) indoor installation;
b) outdoor installation.

5 Requirements

5.1 General

ISGs shall be designed in such a manner that when they are installed in accordance with the manufacturer's instructions, their performance shall be reliable, stable and safe to persons and surrounding equipment.

5.2 Environmental requirements

ISGs shall be designed in such a way that they operate satisfactorily under the environmental conditions given by the normal service conditions. Outdoor ISGs shall be contained in a weather shield of glass-glazed ceramic, or other acceptable material, that is resistant to ultraviolet (UV) light, corrosion and erosion.

Compliance is checked by testing, in accordance with 6.2 and 6.3.

5.3 Documentation and installation instructions

The manufacturer of the ISG shall provide adequate instructions in their literature to ensure that the installer of the ISG can select and install the ISG in a suitable and safe manner.

Compliance is checked by review, in accordance with 6.6.

5.4 Lightning current carrying capability

ISGs shall have sufficient lightning current carrying capability.

Compliance is checked in accordance with 6.5.4 following the manufacturer's declaration for the class of the ISG in accordance with Clause 4.

5.5 Rated impulse sparkover voltage

The ISG shall always spark over at the rated impulse sparkover voltage during the tests.

ISGs can experience some variation of sparkover characteristics before and after the lightning current test. This shall be included in the rated impulse sparkover voltage defined by the manufacturer.

Compliance is checked in accordance with 6.5.3.

5.6 Rated withstand voltage

5.6.1 Rated DC withstand voltage

The ISG shall never spark over at the rated DC withstand voltage or lower voltage during the tests even after performing the lightning current test.

Compliance is checked in accordance with 6.5.2.3.

5.6.2 Rated power frequency withstand voltage

The ISG shall never spark over at the rated power frequency withstand voltage or lower voltage during the tests even after performing the lightning current test.

Compliance is checked in accordance with 6.5.2.2.

5.7 Isolation resistance

Before and after the lightning current test, the isolation resistance shall be equal to or greater than 500 kΩ.

Compliance is checked in accordance with 6.5.1.

5.8 Marking

All products complying with this document shall be marked at least with the following:

a) manufacturer’s or responsible vendor’s name or trade mark or identifying symbol;
b) part number;
c) the classification in accordance with Clause 4.

If the marking in accordance with b) is not practical it may be given on the smallest packaging unit. The marking shall be durable and legible.

Compliance is checked in accordance with 6.7.

NOTE Marking can be applied for example by moulding, pressing, engraving, printing adhesive labels or water slide transfers.

6 Tests

6.1 General test conditions

The tests in accordance with this document are type tests and performed in a sequence according to Annex A.

These tests are of such a nature that, after they have been performed, it is not necessary to repeat them unless changes are made to the materials, design or type of manufacturing process, which can change the performance characteristics of the product, see Annex D.

a) The tests are carried out with the specimens assembled and installed as in normal use according to the manufacturer's or supplier's instructions, unless otherwise specified.
b) Three specimens are subjected to the tests and the requirements are satisfied if all the tests are met, unless otherwise specified.
c) If only one of the specimens does not satisfy a test due to an assembly or a manufacturing fault, that test and any preceding one which can have influenced the results of the test shall be repeated and also the tests which follow shall be carried out in the required sequence on another full set of specimens, all of which shall comply with the requirements.
d) If the ISG has an integral connection component part in its design, it shall be subjected to the testing regime of IEC 62561-1 using the appropriate lightning current given in Table 1 of this document.

The applicant, when submitting a set of specimens, can also submit an additional set of specimens which can be necessary should one specimen fail. The testing laboratory will then, without further request, test the additional set of specimens and will reject the sets only if a further failure occurs. If the additional set of specimens is not submitted at the same time, the failure of one specimen will entail rejection.

For products already tested according to this part of IEC 62561, the applicability of previous tests according to Annex D can be applied.

For new components, complete type tests and samples according to Clause 6 are required.

6.2 Ultraviolet (UV) light test

6.2.1 General test conditions

This test is necessary for ISGs designed to be installed outdoors.

The typical UV effects are covered by the test according to Annex C.

ISG housings for outdoor applications shall withstand UV light effects.

One set of three new specimens shall be assembled and mounted rigidly on an insulating plate (e.g. brick, polytetrafluoroethylene (PTFE)) in accordance with the manufacturer's installation instructions.

The specimens shall be subjected to an environmental test consisting of an ultraviolet light test as specified in Annex C.

6.2.2 Acceptance criteria

The specimens are deemed to have passed this part of the test if there are no signs of disintegration such as cracks, flaking or pitting visible to normal or corrected vision.

Ensure that the surface of the mounting plate is suitable to resist UV radiation.

6.3 Corrosion resistance test

6.3.1 General test conditions

This test is necessary for ISGs having metallic parts designed to be installed outdoors.

The typical corrosion outdoor environment is covered by the test specified in Annex B.

The specimens used in and complying with the test in 6.2, shall be subjected to corrosion tests in accordance with Annex B.

6.3.2 Acceptance criteria

After the parts have been dried during 10 min in a drying oven at a temperature of 100 °C ± 5 °C, they shall not present any trace of rust on surfaces.

Traces of rust on the edges or a yellowish stain removed by rubbing are not taken into account. White rust, patina and other surface oxidations are not considered as corrosive deterioration.

6.4 Impact test

6.4.1 General test conditions

All specimens complying with 6.2 and 6.3 shall be stressed three times by mechanical impacts.

The impacts are carried out on the accessible parts of the ISG, which can be mechanically stressed accidentally.

The specimens are assembled under their normal operating conditions specified in the manufacturer's documentation.

Each arrangement of specimen shall be mounted on an impact test apparatus as described in IEC 60068-2-75:2014, Clause 4 and shown in IEC 60068-2-75:2014, Figure D.1. The impact test apparatus shall be mounted on a solid wall or structure providing sufficient support for the test apparatus.

The hammer shall deliver an impact of 0,35 J (see IEC 60068-2-75:2014, Table 2) perpendicular to the length of the arrangement.

The point of control is located on the surface of the striking part where the line passing through the point of intersection of the axes of the steel tube of the pendulum and the part of striking, perpendicular to the plane crossing the two axes, comes into contact with the surface.

The impacts are not applied to the connectors.

NOTE In theory, the centre of gravity of the striking part is the point of control. As, in practice, it is difficult to determine the centre of gravity, the point of control has been chosen as described above.

6.4.2 Acceptance criteria

After the test, the ISG shall show no cracks or similar damage visible to normal or corrected vision without magnification and shall not present damage which can potentially affect its later use.

6.5 Electrical tests

6.5.1 Isolation resistance

The test is conducted with a DC voltage of 0,5 times the rated DC withstand voltage but not more than 500 V.

The resistance shall be measured after 30 s of applying the test voltage.

The specimen is deemed to have passed the test if the resistance is equal to or greater than 500 kΩ.

6.5.2 Withstand voltage

6.5.2.1 General

The rated withstand voltages shall be tested according to the value declared by the manufacturer in accordance with 5.3.

6.5.2.2 Power frequency withstand voltage

6.5.2.2.1 General test conditions

The rated power frequency withstand voltage is tested by applying an AC voltage at the terminals of the ISG. The voltage is increased continuously at a rate of 100 V/s with a nominal frequency of 50 Hz or 60 Hz until the RMS value as declared by the manufacturer is reached and this is maintained for a time of 60 s ± 1 s.

The prospective short-circuit current of the source can be limited to a minimum value of 5 mA RMS.

6.5.2.2.2 Acceptance criteria

The specimens are deemed to have passed the test if during the application of the test voltage the ISG does not spark over, and conducts a leakage current < 1 mA RMS.

6.5.2.3 DC withstand voltage

6.5.2.3.1 General test conditions

The rated DC withstand voltage shall be tested by applying a DC voltage at the terminals of the ISG. The voltage shall be increased continuously at a rate of 100 V/s until the value as declared by the manufacturer is reached and this is maintained for a time of 60 s ± 1 s.

The prospective short circuit current of the source can be limited to a minimum value of 5 mA.

6.5.2.3.2 Acceptance criteria

The specimens are deemed to have passed the test if during the application of the test voltage the ISG does not spark over, and conducts a leakage current < 1 mA.

6.5.3 Rated impulse sparkover voltage

6.5.3.1 General test conditions

An impulse voltage of 1,2/50 µs with a peak value of the declared impulse sparkover voltage shall be applied at the terminals of the ISG. The test is performed with five surges of positive and five surges of negative polarity and the ISG shall spark over at each test impulse.

6.5.3.2 Acceptance criteria

The specimens are deemed to have passed the test if they have operated at each test impulse and no signs of cracks or punctures appear on the enclosures.

6.5.4 Lightning current

6.5.4.1 General test conditions

After 6.5.3 and the conditioning according to Annex B, the specimens shall be pre-stressed with a test current of 0,5 I_{imp}, followed by a second test current of I_{imp} after the ISG has cooled down approximately to ambient temperature.

The impulse discharge current passing through the device under test is defined by the crest value I_{imp}, the charge Q and the specific energy W/R. The impulse current shall show no reversal and reach I_{imp} within 50 µs. The transfer of the charge Q shall occur within 5 ms and the specific energy W/R shall be dissipated within 5 ms.

All the parameters are given in Table 1 and have been derived from IEC 62305-1:2010, Table 3.

After the current test, the tests according to 6.5.1, 6.5.2 and 6.5.3 shall be carried out.

Table 1 – Lightning impulse current (I_{imp}) parameters[a]

ISG classification	I_{imp} (peak value) kA ± 10 % within 50 µs	Q As $^{+20}_{-10}$ % within 5 ms	W/R kJ/Ω $^{+45}_{-10}$ % within 5 ms
H	100	50	2 500
N	50	25	625
1L	25	12,5	156
2L	10	5	25
3L	5	2,5	6,25
[a] The parameters shall be selected from IEC 62305-1.			

NOTE When a lightning current flows in an arc, a shock wave is produced. The severity of the shock is dependent upon the peak current and the rate of rise of the current. The shorter the rise time, the greater the severity. In general, the acoustic shock wave can cause damage to the surrounding components, such as the enclosure of the ISG.

6.5.4.2 Acceptance criteria

The specimens are deemed to have passed the test if no signs of cracks or punctures appear on the enclosures.

6.6 Documentation and installation instructions

6.6.1 General conditions

The content of the installation instructions is checked in accordance with its completeness by review.

6.6.2 Acceptance criteria

Installation instructions are deemed to be acceptable if they contain at least the following:

a) classification according to 4.1 and lightning current capability (I_{imp});

b) rated withstand voltage;

c) rated power frequency withstand voltage ($U_{W\,AC}$);

d) rated DC withstand voltage ($U_{W\,DC}$);

e) assembly instructions with installation location according to 4.2 (if crucial to the function);

f) appropriate connection components for the installation if not part of the ISG.

6.7 Marking test

6.7.1 General test conditions

The marking is checked by inspection and by rubbing it by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with white spirit or mineral spirit.

Marking made by moulding, pressing or engraving is not subjected to this test.

6.7.2 Acceptance criteria

The specimen is deemed to have passed the test if the marking remains legible.

7 Electromagnetic compatibility (EMC)

Products covered by this document are, in normal use, passive with respect to electromagnetic influences (emission and immunity).

8 Structure and content of the test report

8.1 General

The purpose of this Clause 8 is to provide general requirements for laboratory test reports. It is intended to promote clear, complete reporting procedures for laboratories submitting test reports.

The results of each test carried out by the laboratory shall be reported accurately, clearly, unambiguously and objectively, in accordance with any instructions in the test methods. The results shall be reported in a test report and shall include all the information necessary for the interpretation of the test results and all information required by the method used.

The report shall be arranged and presented in such a way that it is easily assimilated by the reader, especially with regards to presentation of the test data. The format shall be specifically designed for each type of test carried out, but the headings shall be standardized as indicated below.

The structure of each report shall include at least the information given in 8.2 to 8.9.

8.2 Report identification

The following information shall be included in the report

a) a title or subject of the report;
b) name and email address or telephone number of the test laboratory;
c) name, address and telephone number of the sub-test laboratory where the test was carried out if different from the company which has been assigned to perform the test;
d) unique identification number (or serial number) of the test report;
e) name and address of the vendor;
f) paginated report and indication of the total number of pages;
g) date of issue of the report;
h) date(s) of performance of test(s);
i) signature and title, or an equivalent identification of the person(s) authorized to sign for the testing laboratory for the content of the report;
j) signature and title of person(s) conducting the test(s);
k) declaration, in order to avoid misuse, as follows: "This type test report shall not be reproduced other than in full, except with the prior written approval of the issuing testing laboratory. This type test report only covers the samples submitted for test and does not produce evidence of the quality for series production."

8.3 Specimen description

a) sample identification;
b) detailed description and unambiguous identification of either the test sample or test assembly or both for example part number, type, classification, material, dimensions;
c) characterization and condition of either the test sample or test assembly or both;
d) sampling procedure, where relevant;
e) date of receipt of test items;
f) photographs, drawings or any other visual documentation.

8.4 Standards and references

a) identification of the test standard used and the date of issue of the standard;
b) other relevant documentation with the documentation date.

8.5 Test procedure

a) description of the test procedure;
b) justification for any deviations from, additions to or exclusions from the referenced standard;
c) any other information relevant to a specific test such as environmental conditions;
d) configuration of testing assembly and measuring set-up;
e) location of the arrangement in the testing area and measuring techniques.

8.6 Testing equipment description

Description of equipment used for every test conducted, e.g. generator, conditioning or ageing device.

8.7 Measuring instruments description

Characteristics and calibration dates of all instruments used for measuring the values specified in this document, e.g. shunts, oscilloscope, ohmmeter, torque meter.

8.8 Results and parameters recorded

The measured, observed or derived results shall be clearly identified at least for:

a) isolation resistance;
b) withstand voltage (power frequency withstand voltage, DC withstand voltage);
c) rated sparkover voltage;
d) lightning current carrying capability (current, charge, specific energy, duration);
e) connection component test results in accordance with 6.1 d) (ohmic resistance, tightening and loosening torques);
f) marking;
g) statement of UV resistance;
h) corrosion resistance;
i) impact resistance;
j) installation instructions.

The above shall be presented by means of tables, graphs, drawings, photographs or other documentation of visual observations as appropriate.

8.9 Statement of pass or fail

A statement of pass or fail identifying the part of the test for which the specimen has failed and also a description of the failure.

Annex A
(normative)

Flowchart for testing ISGs

A flowchart of tests for ISGs is shown in Figure A.1. An ISG with an integral connection component part in its design shall be subjected to the testing regime of IEC 62561-1 using the appropriate lightning current given in Table 1.

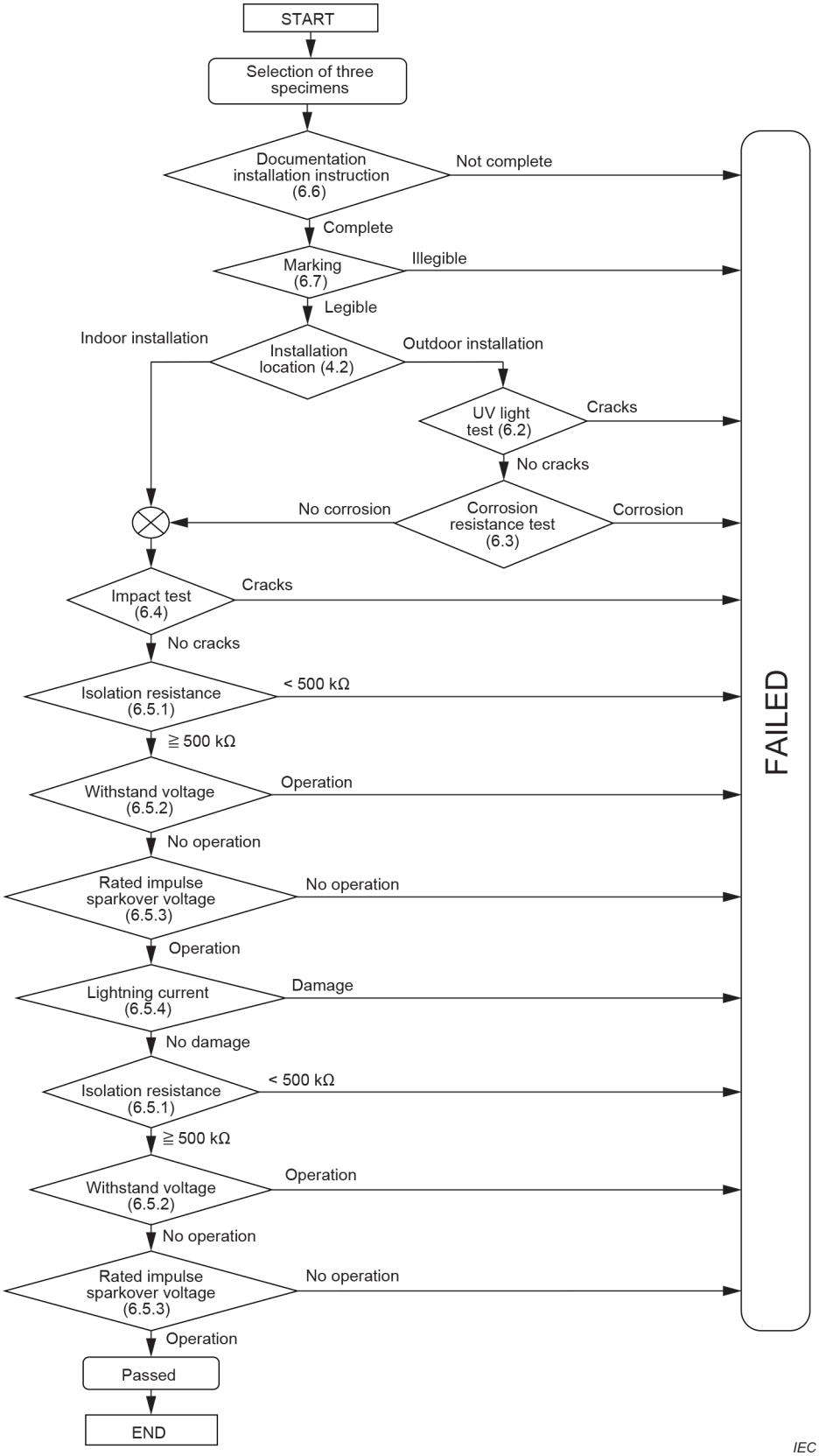

Figure A.1 – Flowchart of the sequence of tests for ISGs

Annex B
(normative)

Resistance to corrosion tests for ISGs

B.1 General

The conditioning and ageing test consists of a salt mist treatment as specified in Clause B.2, followed by a humid sulphurous atmosphere treatment as specified in Clause B.3 and an additional ammonia atmosphere treatment for specimens where any component part is made of copper alloy with a copper content less than 80 %, as specified in Clause B.4.

The manufacturer or supplier shall provide proof of the copper content of any part of the assembly made from an alloy of copper.

B.2 Salt mist treatment

The salt mist treatment shall be in accordance with IEC 60068-2-52:2017 except for Clauses 7, 10 and 11 which are not applicable. The test is carried out using severity (2).

If the salt mist chamber can maintain both the temperature conditions, as specified in IEC 60068-2-52:2017, 9.3 and a relative humidity of not less than 90 %, then the specimen can remain in the test chamber for the humidity storage period.

B.3 Humid sulphurous atmosphere treatment

The humid sulphurous atmosphere treatment shall be in accordance with ISO 22479:2019 Method B with seven cycles with a sulphur dioxide content 0,2 l at (300 ± 10) l of capacity, except for Clauses 9 and 10 which are not applicable.

Each cycle which has a duration of 24 h is composed of a heating period of 8 h at a temperature of 40 °C ± 3 °C in the humid saturated atmosphere which is followed by a rest period of 16 h. After that, the humid sulphurous atmosphere is replaced.

If the humid sulphurous atmosphere treatment test chamber maintains the temperature conditions as specified in ISO 22479:2019, 8.5 then the specimen can remain in the chamber for the storage period.

B.4 Ammonia atmosphere treatment

The ammonia atmosphere treatment shall be in accordance with ISO 6957:1988 for a moderate atmosphere with the pH value 10 except for 8.4 and Clause 9, which are not applicable.

Annex C
(normative)

Environmental test for outdoor isolating spark gaps – Resistance to ultraviolet light

C.1 General

A set of samples shall be subjected to ultraviolet light conditioning specified in Clause C.2, or Clause C.3, or Clause C.4. All sets tested are considered representative of the material's entire colour range.

Samples shall be mounted on the inside of the cylinder in the ultraviolet light apparatus so that the samples do not touch each other and shall be positioned in such a way that their surface is exposed perpendicularly to the light source.

C.2 Test

The specimens shall be exposed for (1 000 ± 1) h to a xenon-arc, in accordance with ISO 4892-2:2013, Method A. Continuous exposure to light and intermittent exposure to water spray, with a programmed cycle of (120 ± 1) min consisting of a (102 ± 1) min light exposure and a (18 ± 1) min exposure to water spray with light, shall be used. The apparatus shall operate with a water-cooled xenon-arc lamp, borosilicate glass inner and outer optical filters, a spectral irradiance of 0,35 W × m^{-2} × nm^{-1} at 340 nm and a black panel temperature of (65 ± 3) °C. The temperature of the chamber shall be (45 ± 5) °C. The relative humidity in the chamber shall be (50 ± 5) %.

C.3 First alternative test to C.2

The specimens shall be exposed for (720 ± 1) h to an open-flame sunshine carbon-arc, in accordance with ISO 4892-4. Continuous exposure to light and intermittent exposure to water spray, with a programmed cycle of (120 ± 1) min consisting of a (102 ± 1) min light exposure and an 18 min exposure to water spray with light, shall be used. The apparatus shall operate with an open-flame sunshine carbon-arc lamp, borosilicate glass type 1 inner and outer optical filters, a spectral irradiance of 0,35 W × m^{-2} × nm^{-1} at 340 nm and a black panel temperature of (63 ± 3) °C. The temperature of the chamber shall be (45 ± 5) °C with a relative humidity of (50 ± 5) %.

C.4 Second alternative test to C.2

The specimens shall be exposed for total irradiation energy equal to the values given in Clause C.2, and to fluorescent UV light in accordance with ISO 4892-3:2016. The exposure conditions shall be by continuous exposure to light and intermittent exposure to water spray, with a programmed cycle of (360 ± 1) min light exposure and (60 ± 1) min exposure to water spray with light as described in ISO 4892-3.2016, Table 4, Method A, cycle 3.

Annex D
(normative)

Applicability of previous tests

For ISGs already successfully tested in accordance with IEC 62561-3:2017, differences between versions in the test procedures identified in Table D.1, are not considered significant enough to warrant the re-testing of the product to meet the requirements of IEC 62561-3:2023.

It is not necessary to repeat tests when the manufacturer of that product clearly states that their product meets all the following requirements.

- There is no change in the classification of the product since it was successfully tested.
- There is no change in the method of manufacture of the product since it was successfully tested.
- There is no change in the design of the product since it was successfully tested.
- There is no change in the materials used in the product since it was successfully tested.

For new products, complete type tests according to this document shall be performed.

Table D.1 – Differences in the requirements for ISGs complying with IEC 62561-3:2017

Test description	Clause or Subclause in this document	Re-testing required
Impact test	6.4	No
Salt mist treatment	B.2	No
Humid sulphurous atmosphere treatment	B.3	No
Xenon-arc UV light test	C.2	No
Fluorescent UV light test	C.4	No

Bibliography

IEC 60079-10 (all parts), *Explosive atmospheres – Part 10: Classification of areas*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61643-11, *Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage power systems – Requirements and test methods*

IEC 62305-3, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

IEC 62305-4, *Protection against lightning – Part 4: Electrical and electronic systems within structures*

CLC/TS 50703-2, *Lightning Protection System Components (LPSC) – Part 2: Specific testing requirements for LPS components used in explosive atmospheres*

NATIONAL ANNEX E

(*National Foreword*)

E-1 BIS CERTIFICATION MARKING

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

(*Continued from second cover*)

International Standard	*Title*
ISO 22479 : 2019	Corrosion of metals and alloys — Sulphur dioxide test in a humid atmosphere (fixed gas method)
IEC 60068-2-52 : 2017	Environmental testing — Part 2-52: Tests — Test Kb: Salt mist, cyclic (sodium chloride solution)
IEC 60068-2-75 : 2014	Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests
IEC 62561-1	Lightning protection system components (LPSC) — Part 1: Requirements for connection components

Only the English language text has been retained while adopting it in this Indian Standard, and as such, the page number given here are not the same as in the IEC publication.

India specific changes have been made to the adopted IEC 62561-3 as outlined in National Annex E.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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